

FIG. 1

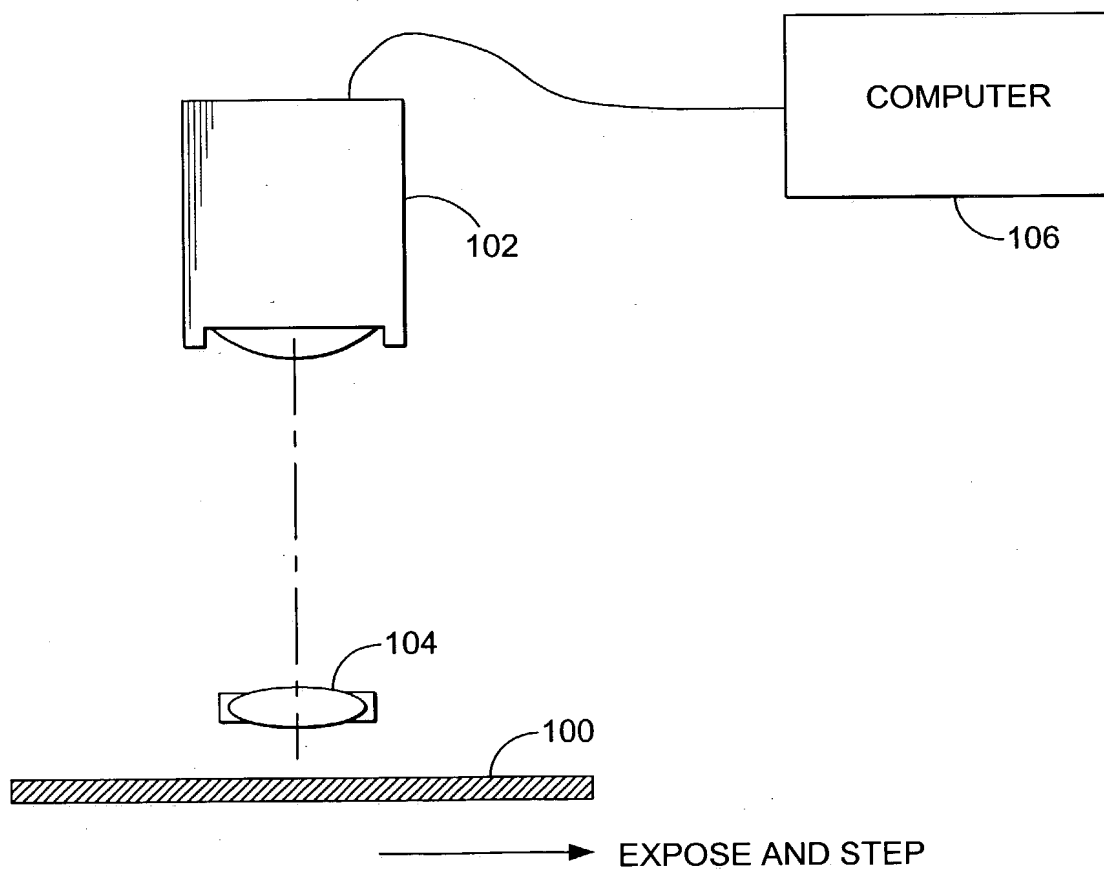


FIG. 4

FIG. 2

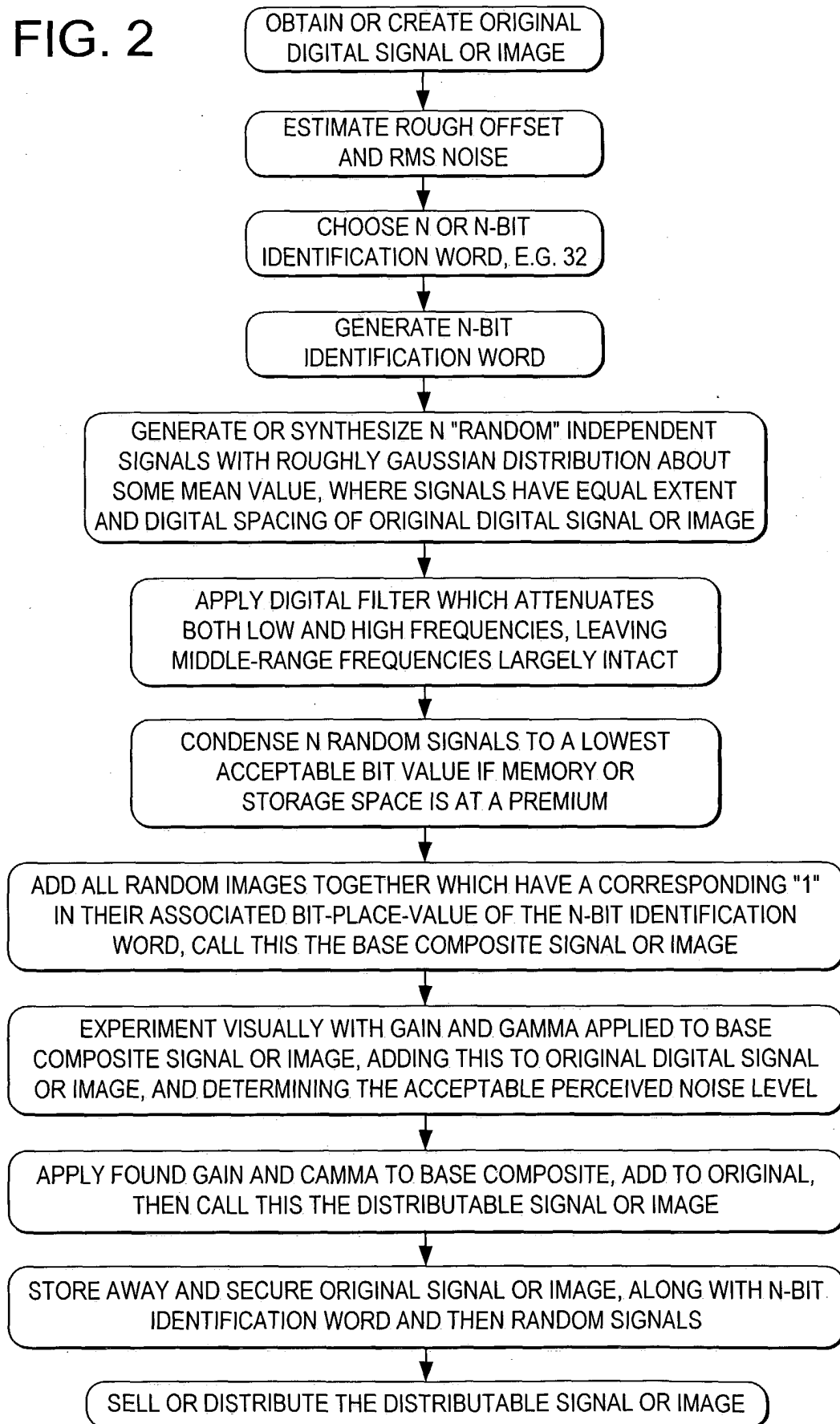
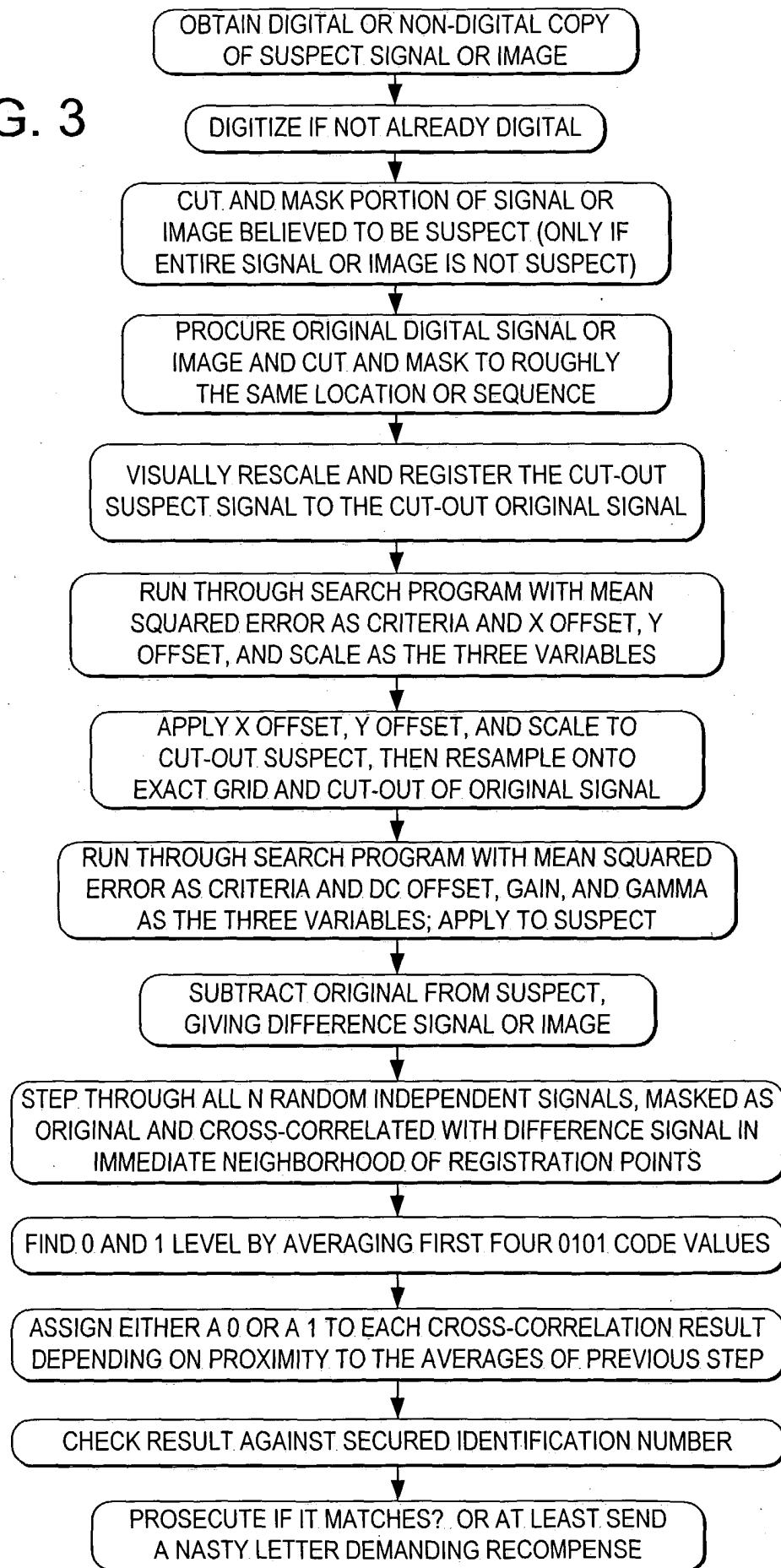


FIG. 3



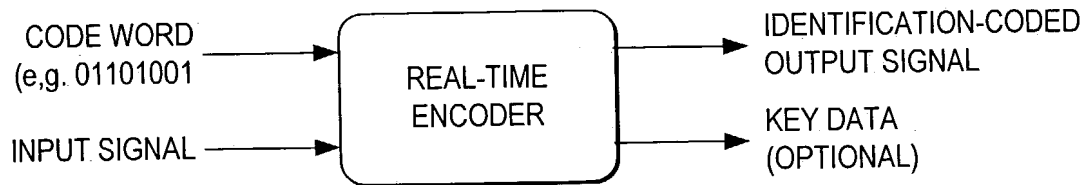


FIG. 5

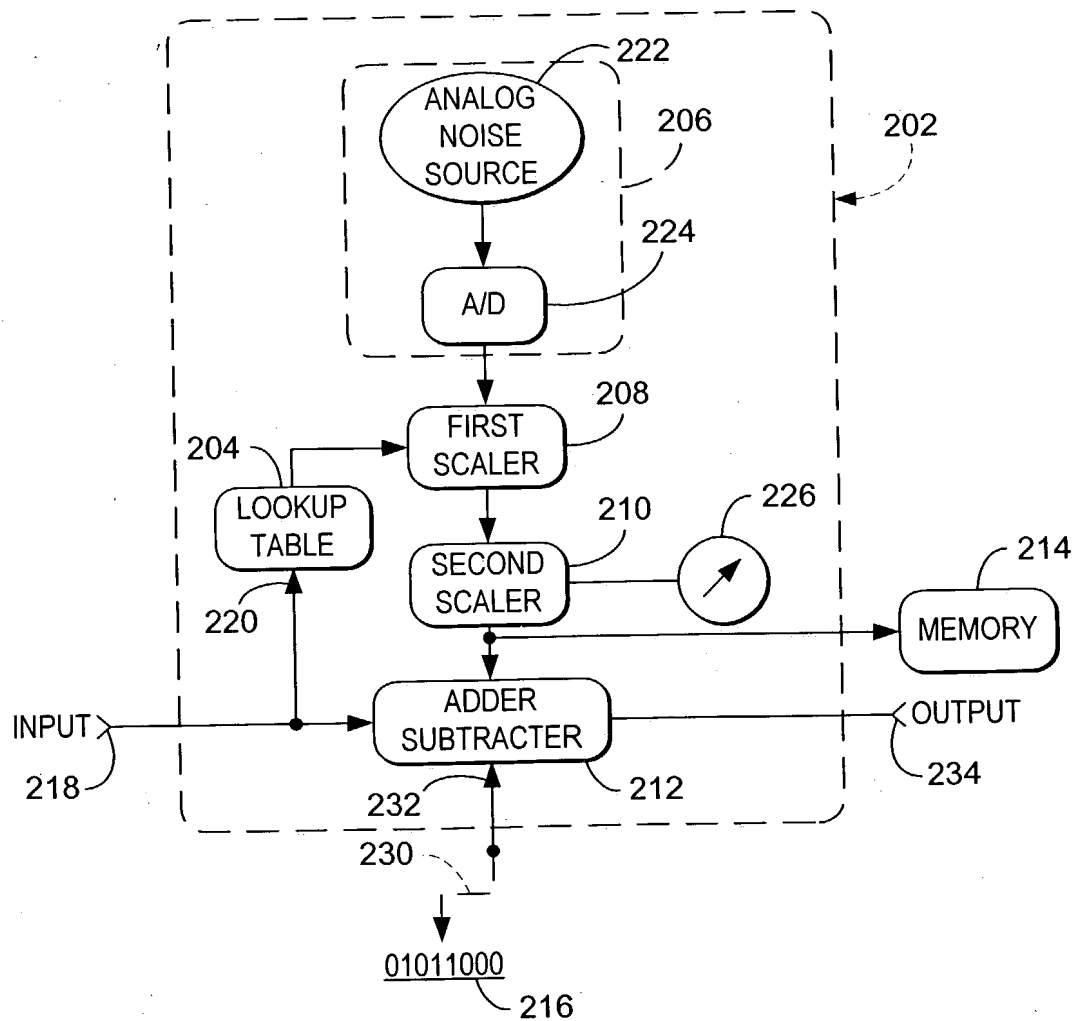


FIG. 6

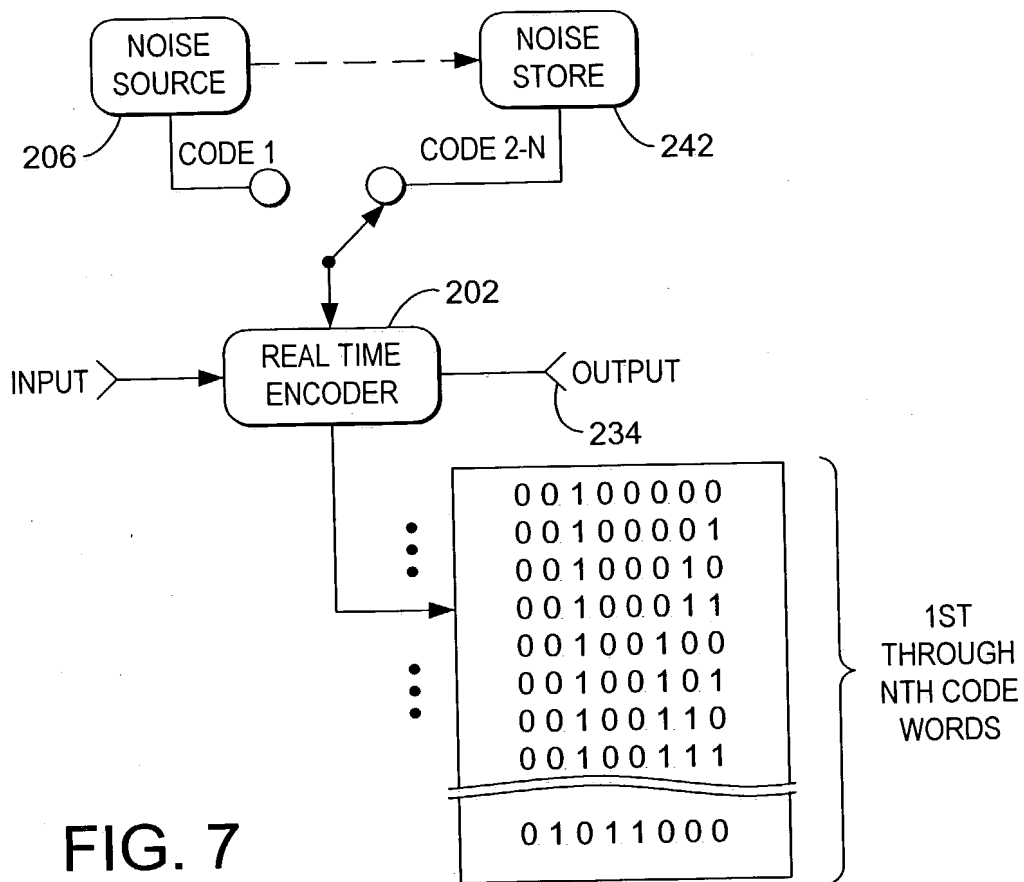


FIG. 7

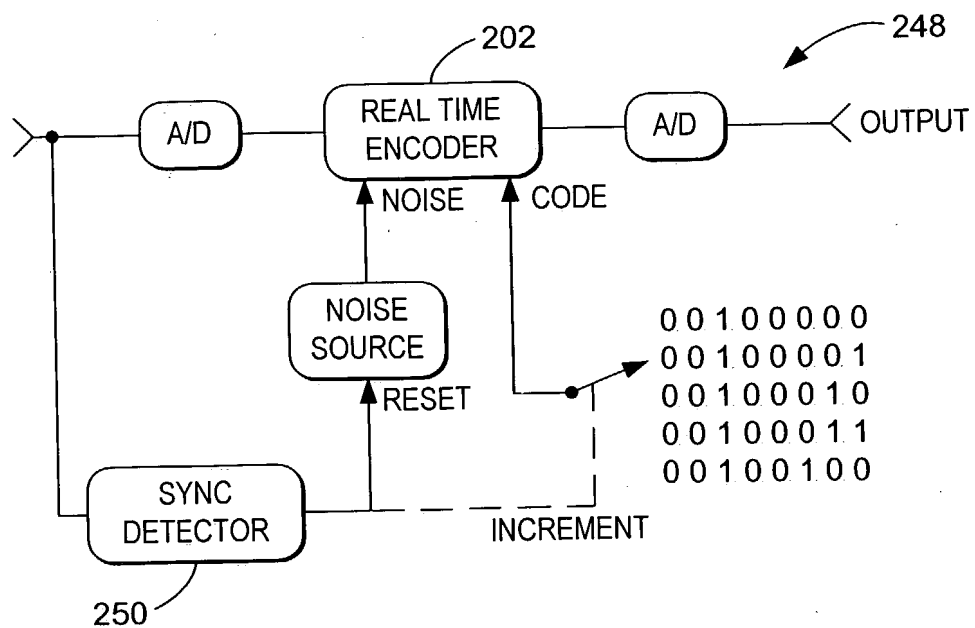
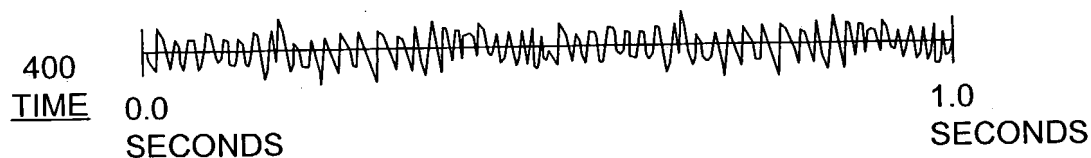
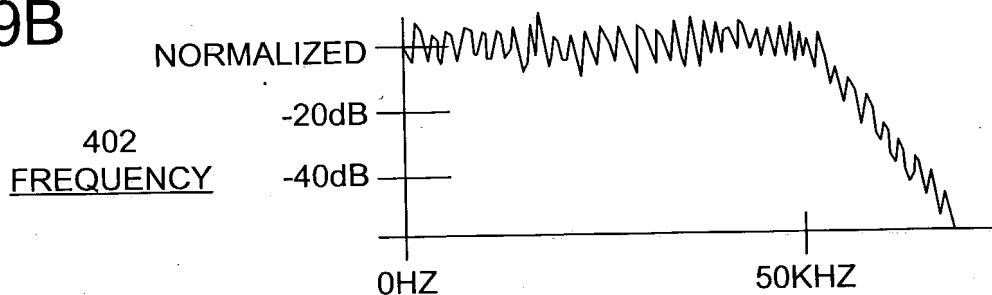


FIG. 8

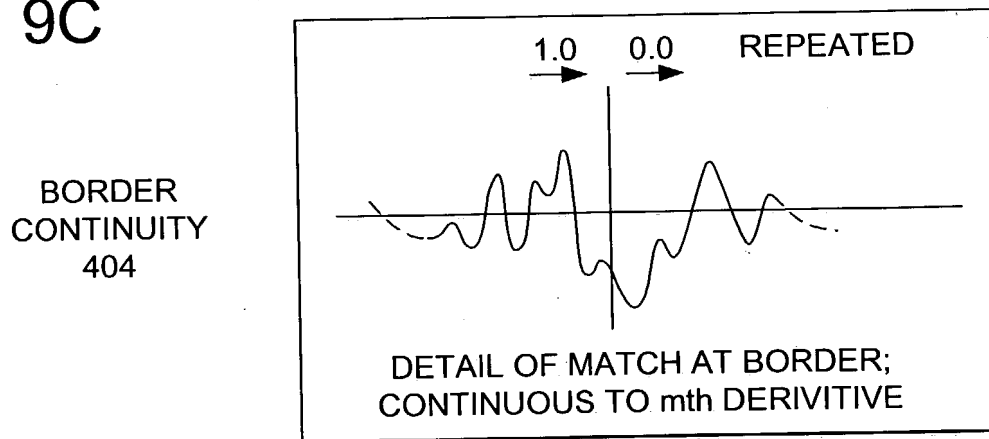
# FIG. 9A



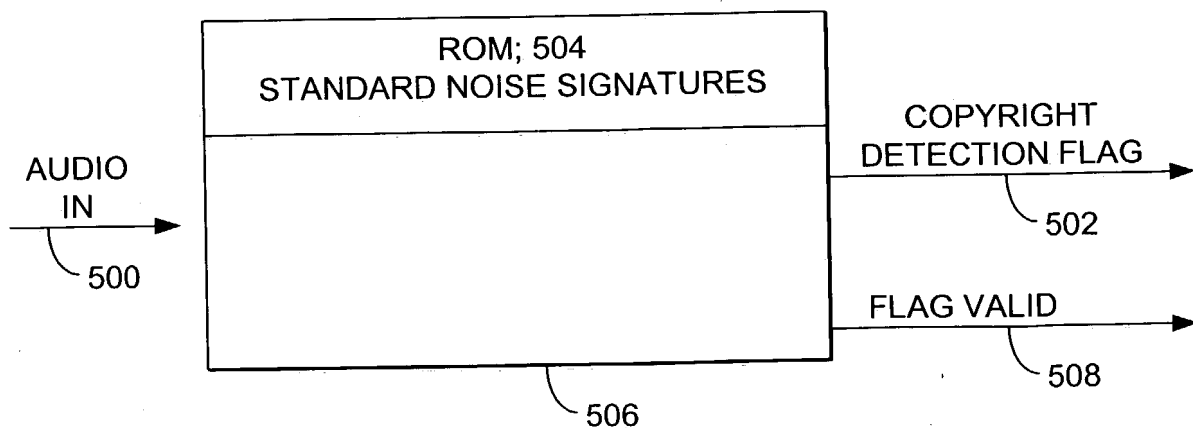
# FIG. 9B



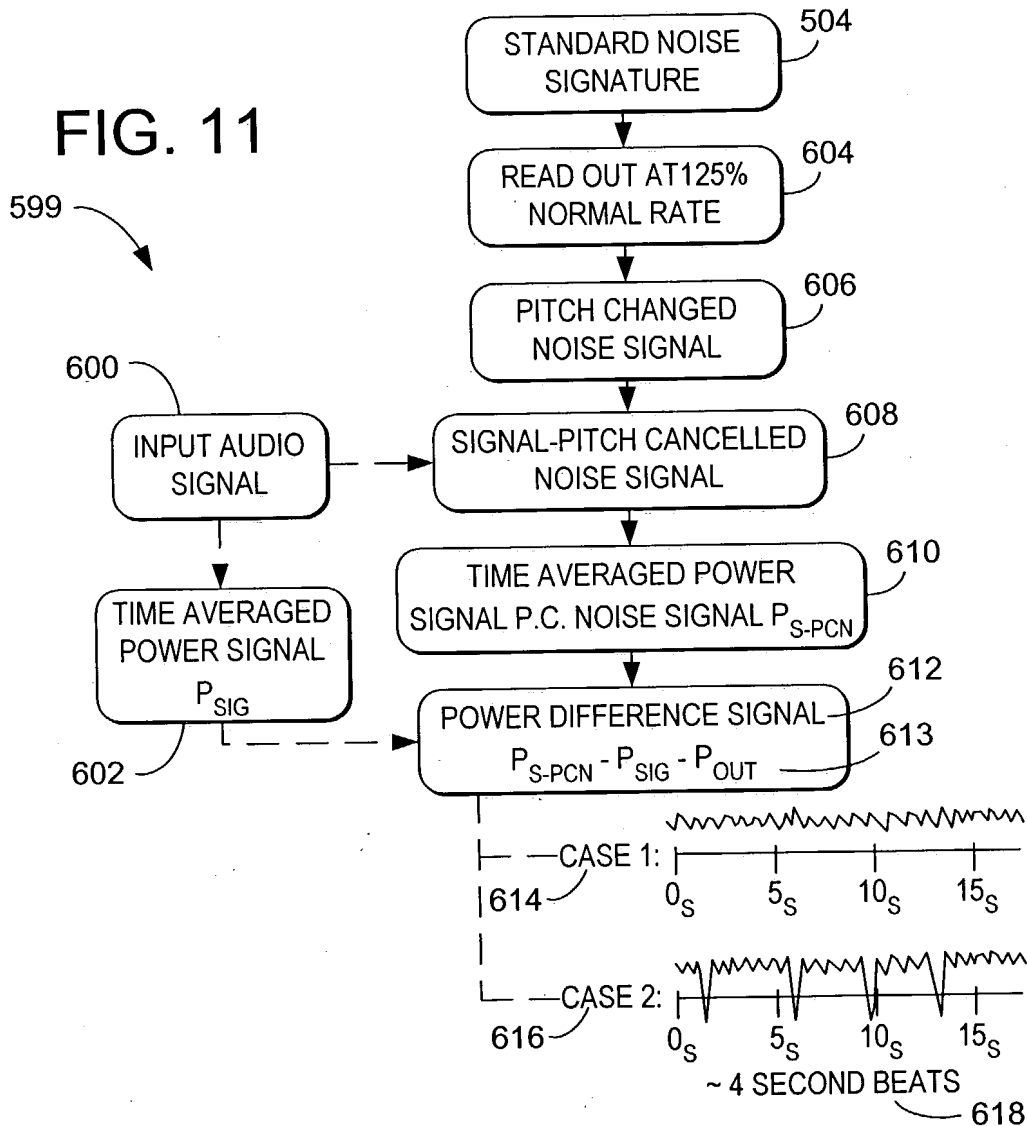
# FIG. 9C



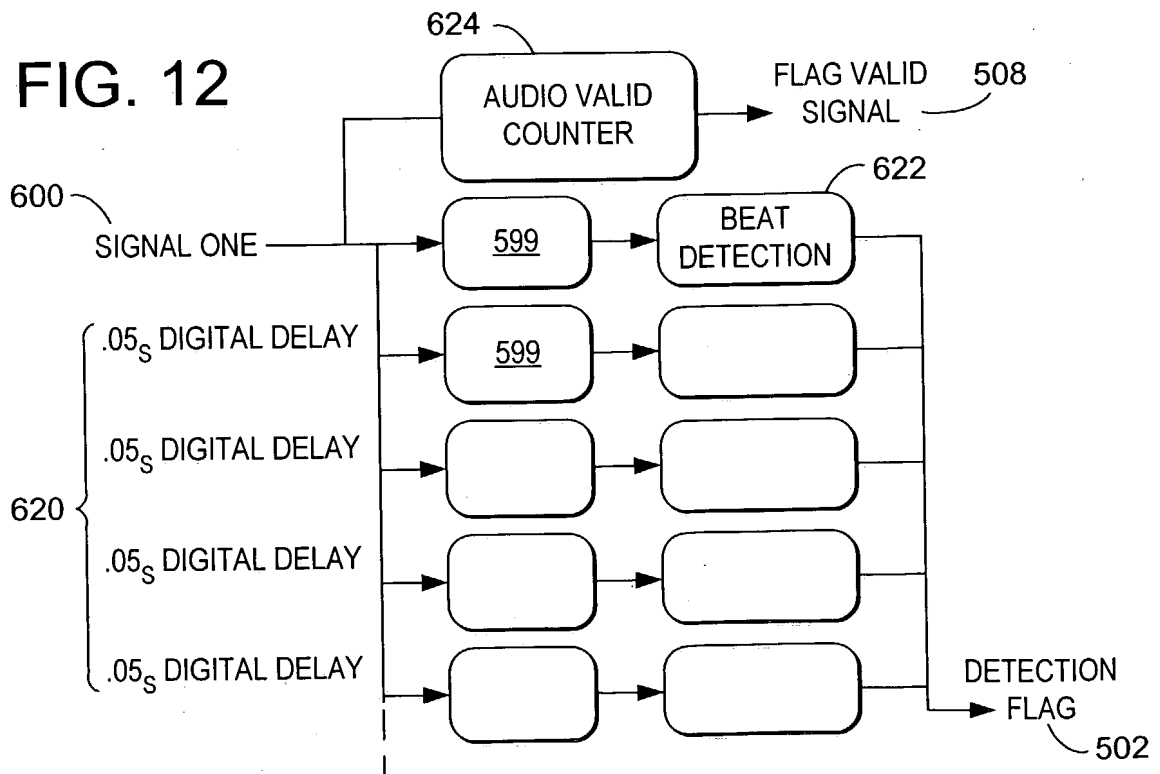
# FIG. 10

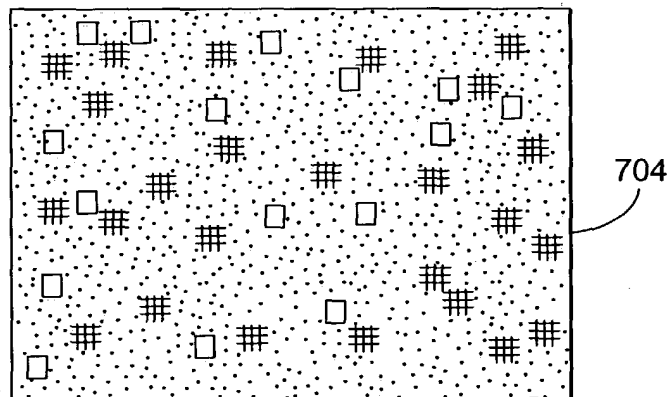
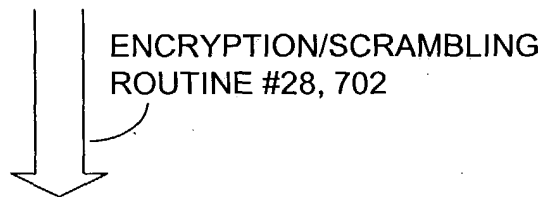
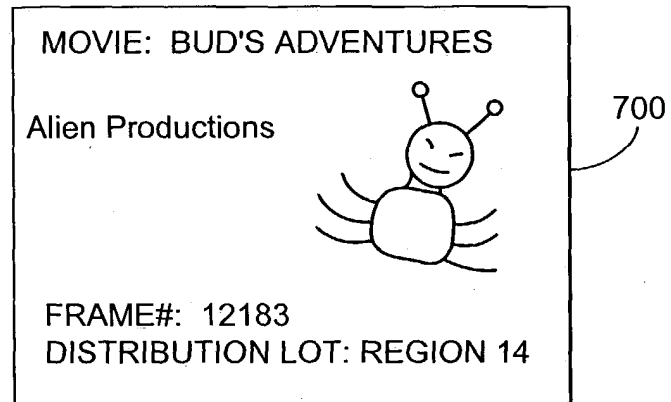


# FIG. 11



# FIG. 12

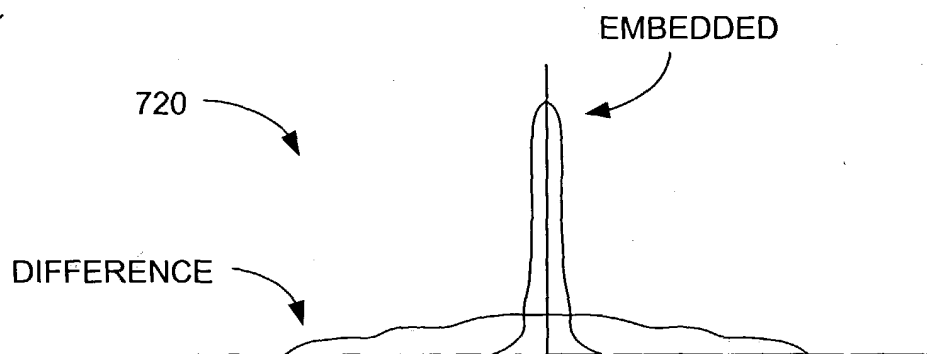




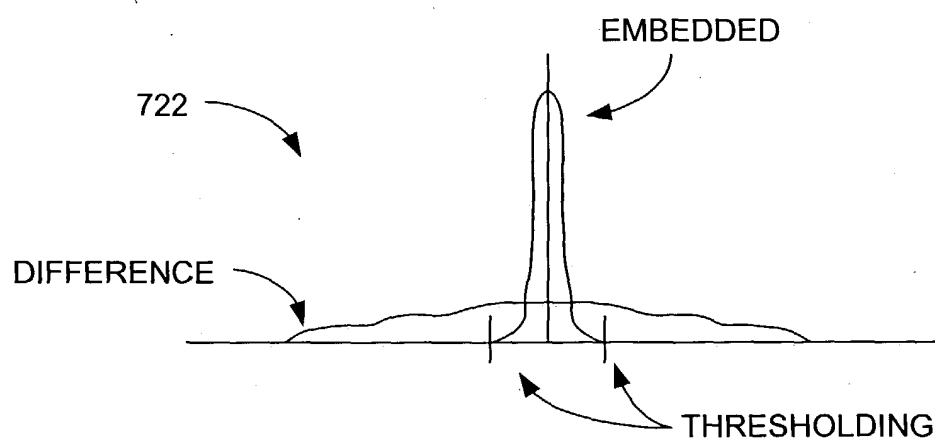
PSEUDO-RANDOM MASTER SNOWY IMAGE  
(SCALED DOWN AND ADDED TO FRAME 12183)

FIG. 13





MEAN-REMOVED HISTOGRAMS OF DIFFERENCE  
SIGNAL AND KNOWN EMBEDDED CODE SIGNAL



MEAN-REMOVED HISTOGRAMS OF FIRST  
DERIVATIVES (OR SCALAR GRADIENTS IN CASE OF AN  
IMAGE)

FIG. 14

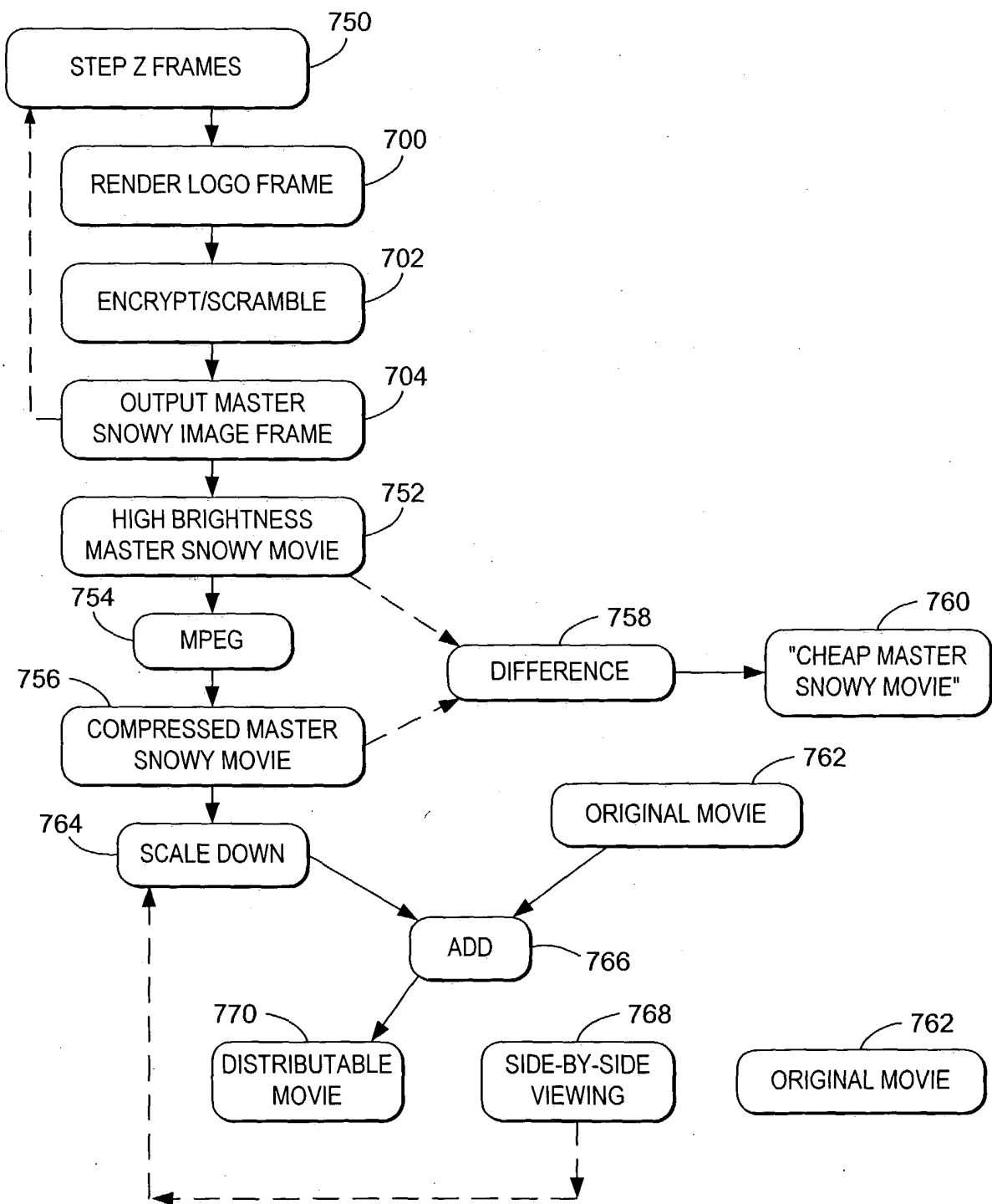


FIG. 15

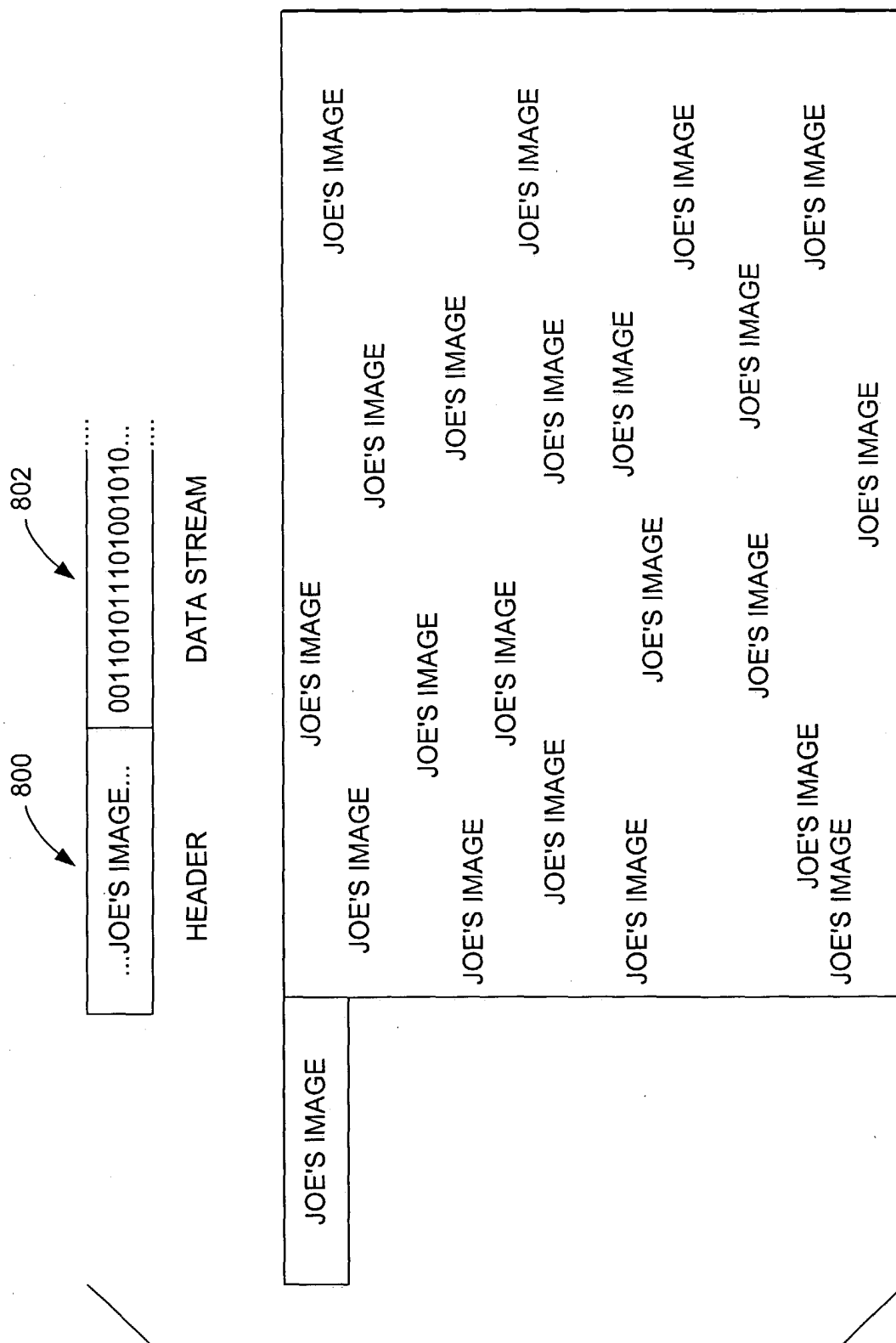
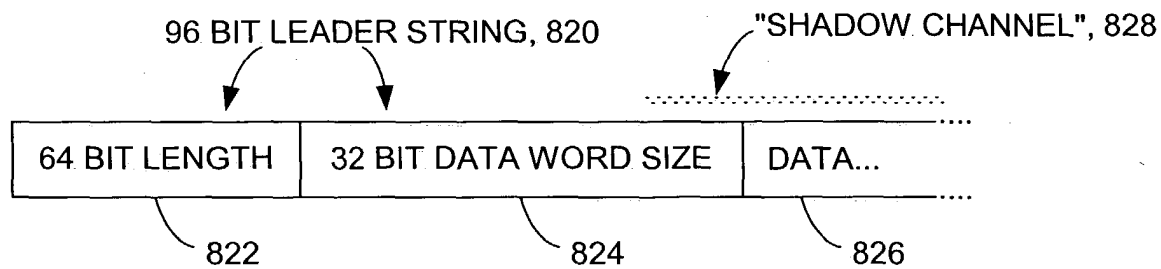


FIG. 16



UNIVERSAL EMPIRICAL DATA FORMAT

FIG. 17

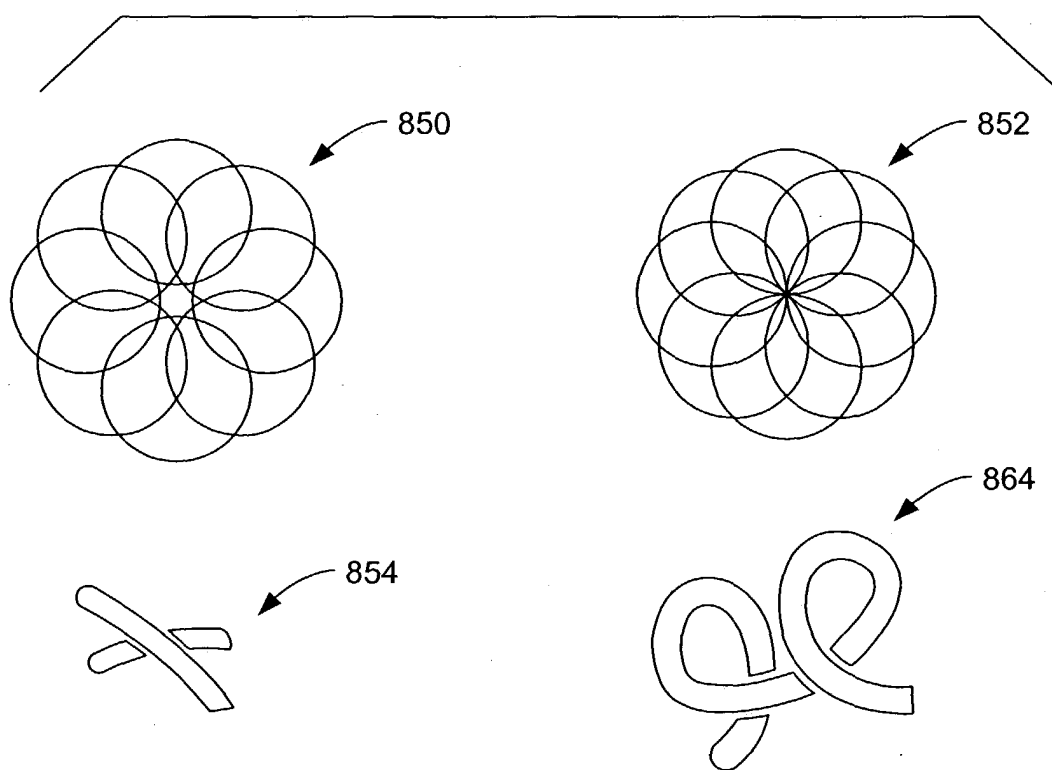
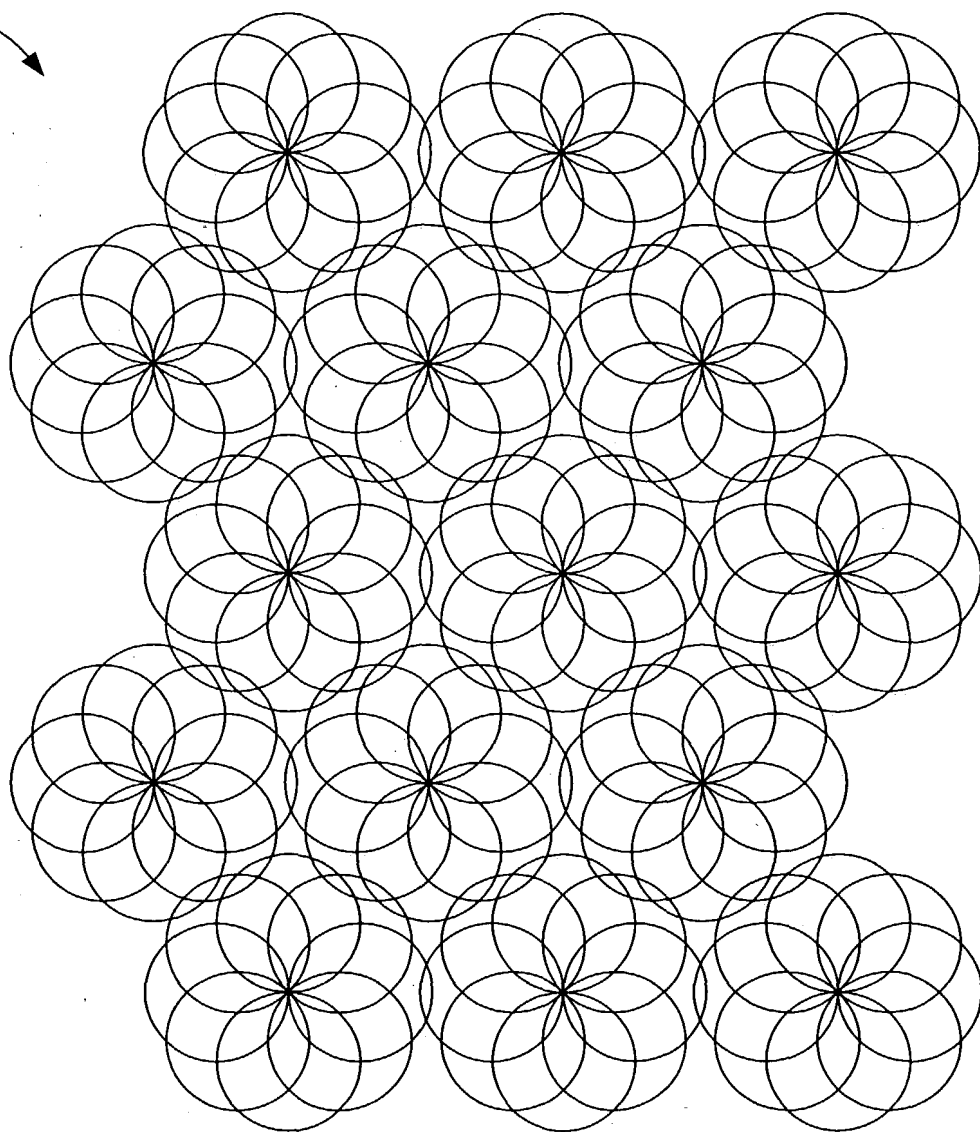


FIG. 18

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QUEST FOR MOSAICED KNOT PATTERNS WHICH "COVER" AND  
ARE COEXTENSIVE WITH ORIGINAL IMAGE; ALL ELEMENTAL  
KNOT PATTERNS CAN CONVEY THE SAME INFORMATION, SUCH  
AS A SIGNATURE, OR EACH CAN CONVEY A NEW MESSAGE IN A  
STEGANOGRAPHIC SENSE

FIG. 19

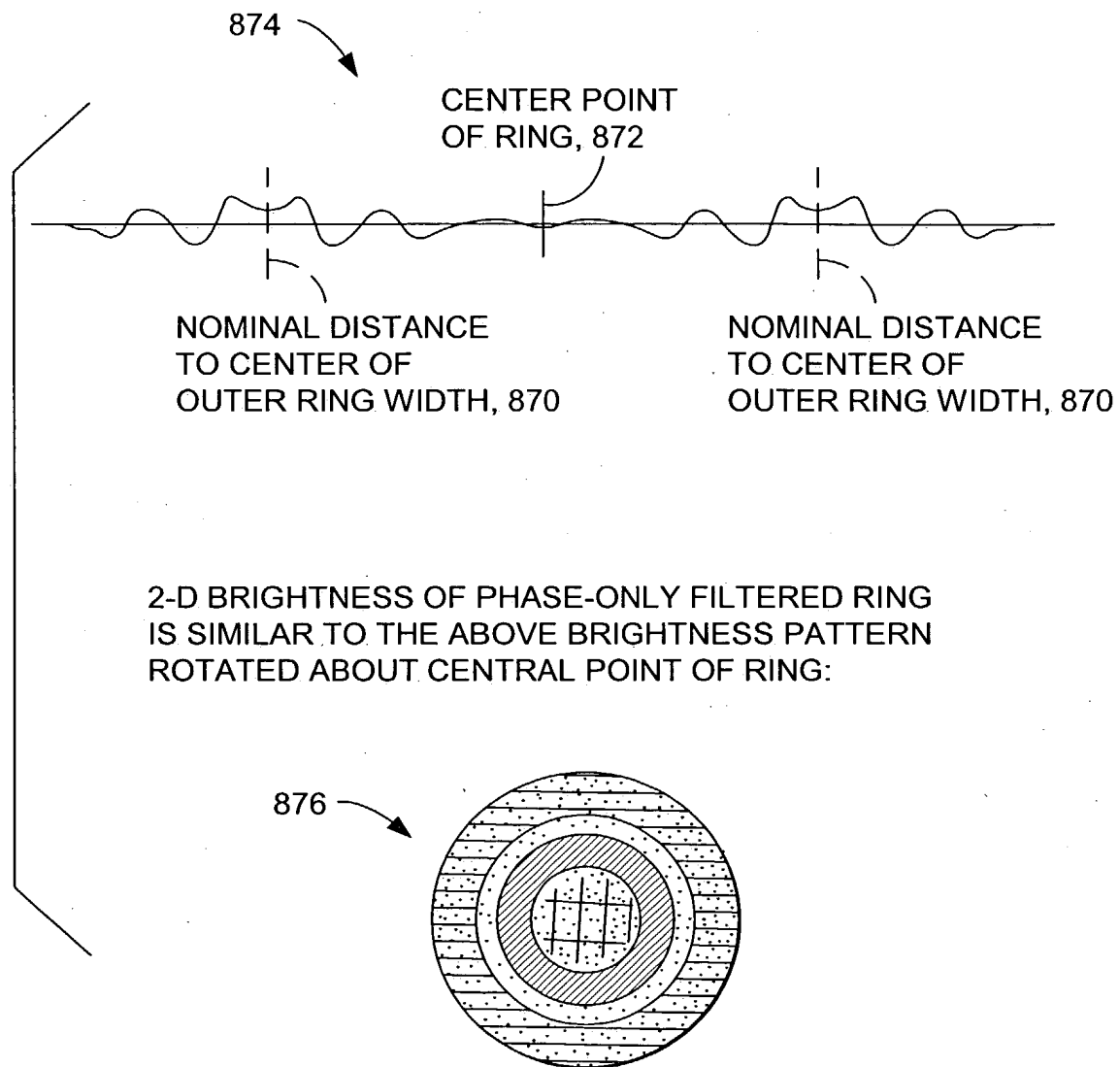
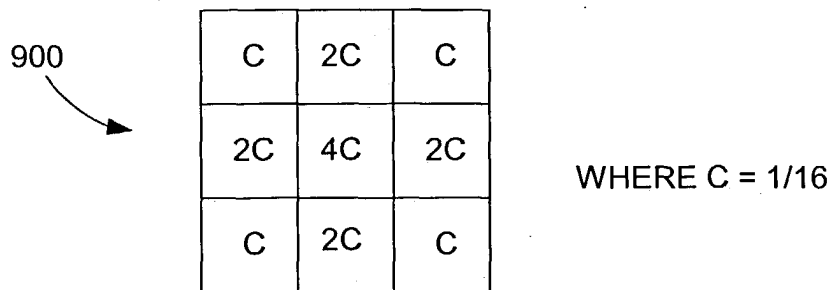
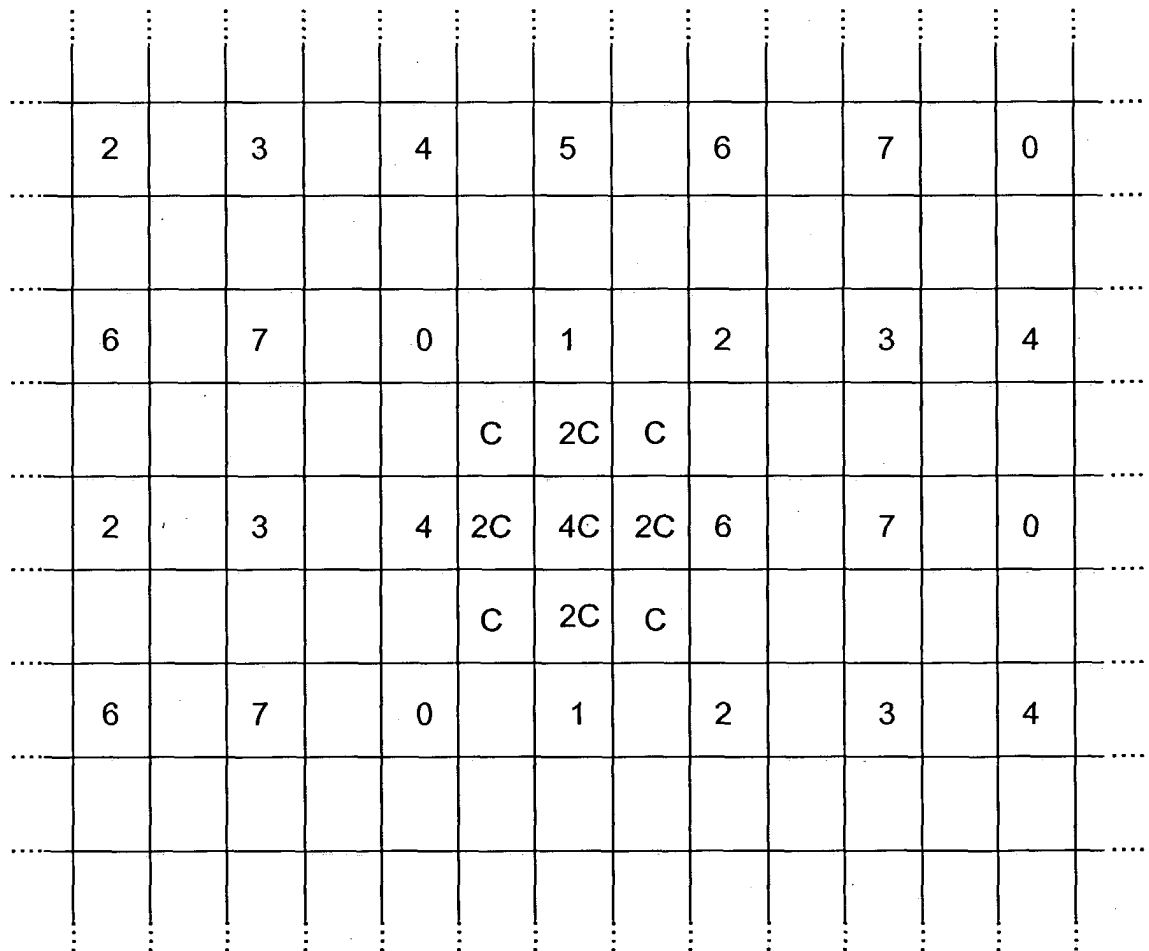


FIG. 20



ELEMENTARY BUMP (DEFINED  
GROUPING OF PIXELS WITH  
WEIGHT VALUES)

FIG. 21A



EXAMPLE OF HOW MANY ELEMENTARY BUMPS, 900, WOULD BE ASSIGNED LOCATIONS IN AN IMAGE, AND THOSE LOCATIONS WOULD BE ASSOCIATED WITH A CORRESPONDING BIT PLANE IN THE N-BIT WORD, HERE TAKEN AS  $N=8$  WITH INDEXES OF 0-7. ONE LOCATION, ASSOCIATED WITH BIT PLANE "5", HAS THE OVERLAY OF THE BUMP PROFILE DEPICTED.

FIG. 21B

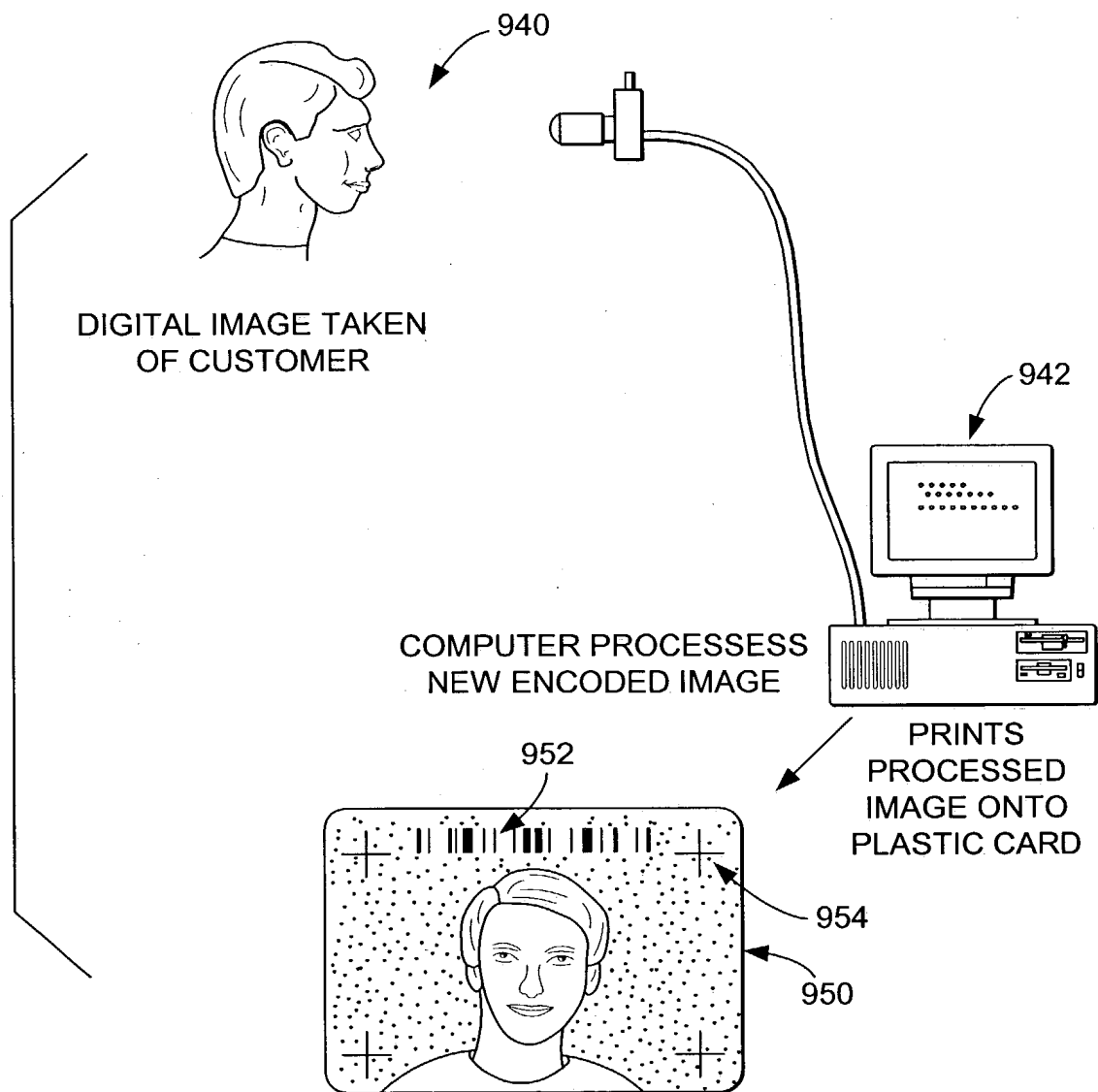
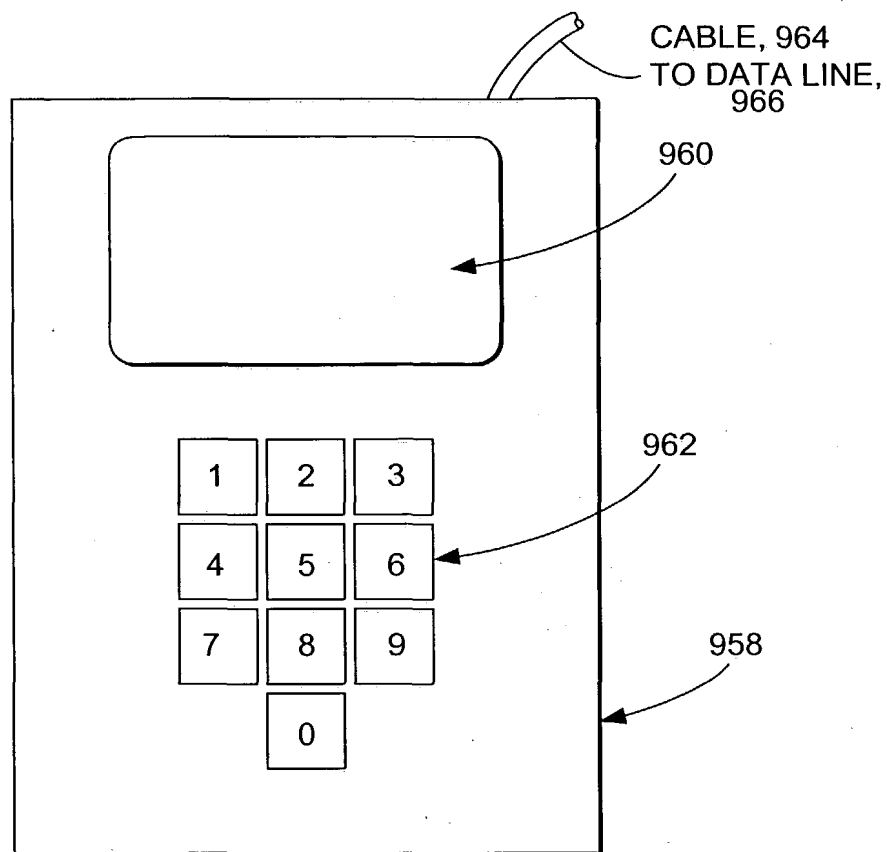


FIG. 22

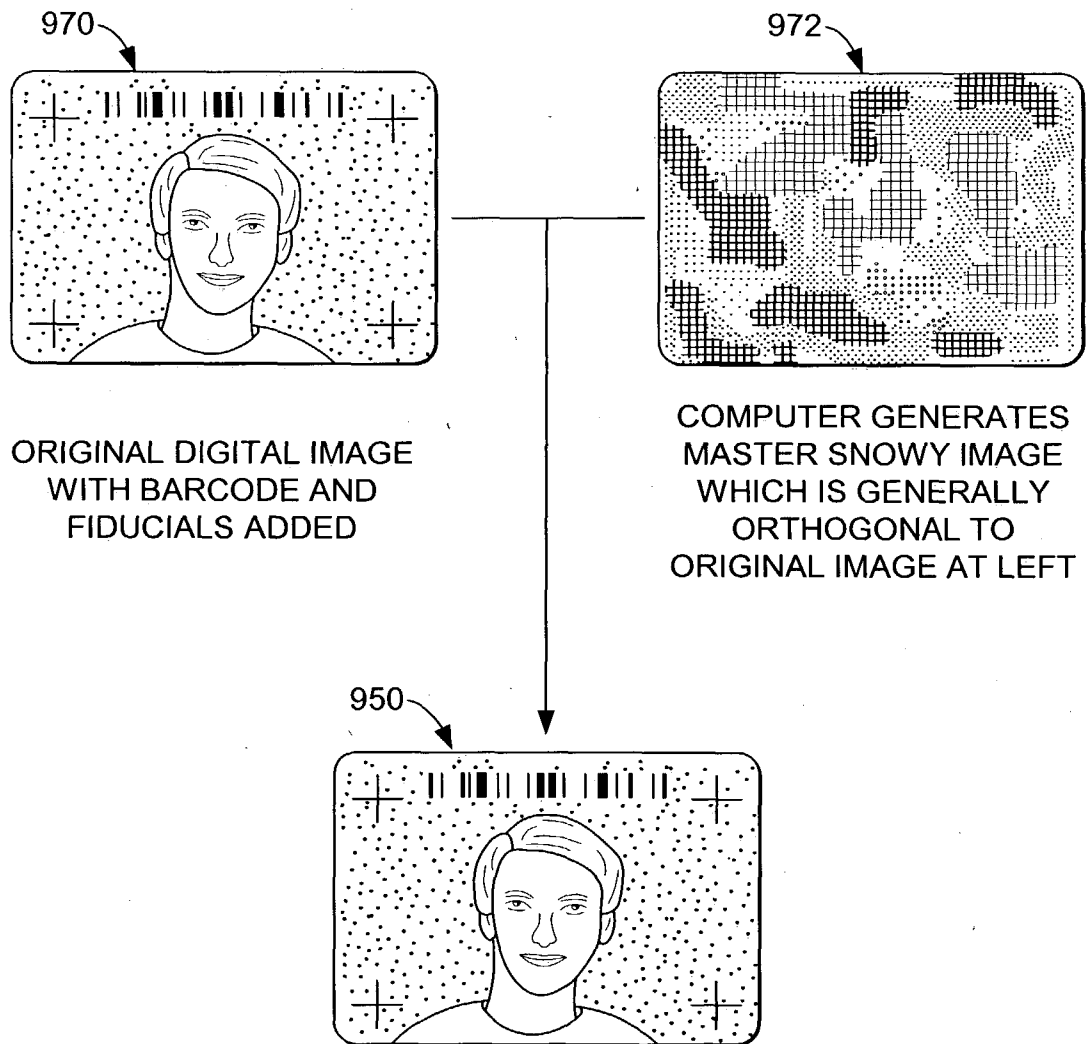




CONTAINS RUDIMENTARY OPTICAL SCANNER,  
MEMORY BUFFERS, COMMUNICATIONS DEVICES,  
AND MICROPROCESSOR

CONSUMER MERELY PLACES CARD INTO WINDOW  
AND CAN, AT THEIR PREARRANGED OPTION, EITHER  
TYPE IN A PERSONAL IDENTIFICATION NUMBER (PIN,  
FOR ADDED SECURITY) OR NOT. THE TRANSACTION  
IS APPROVED OR DISAPPROVED WITHIN SECONDS.

FIG. 23



COMBINED TO FORM PERSONAL CASH CARD

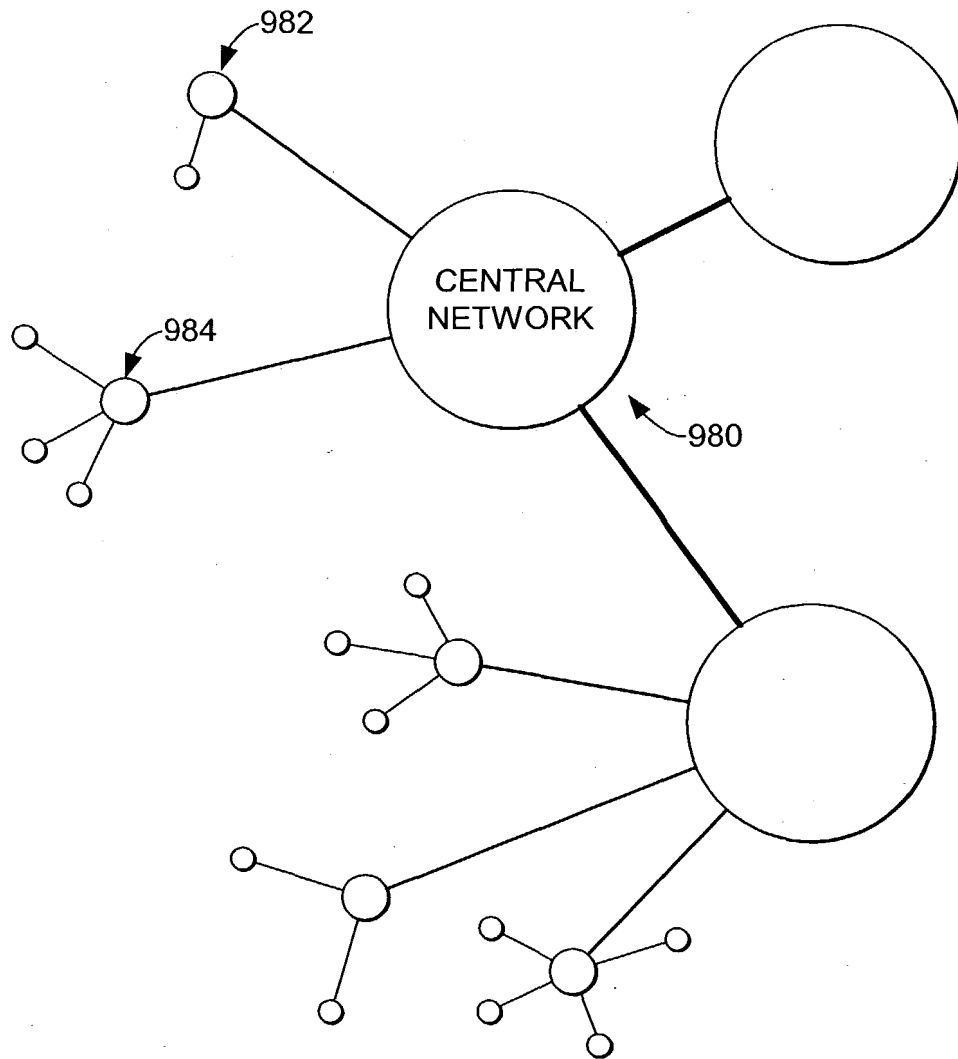
FIG. 24

## TYPICAL TRANSACTION STEPS

1. READER SCANS IMAGE ON CARD, STORES IN MEMORY, EXTRACTS PERSON'S ID
2. OPTIONAL: USER KEYS IN PIN NUMBER
  3. READER CALLS CENTRAL ACCOUNT DATA NETWORK, HANDSHAKES
  4. READER SENDS ID, (PIN), MERCHANT INFORMATION, AND REQUESTED TRANSACTION AMOUNT TO CENTRAL NETWORK
    5. CENTRAL NETWORK VERIFIES ID, PIN, MERCHANT INFO, AND ACCOUNT BALANCE
    6. IF OK, CENTRAL NETWORK GENERATES TWENTY-FOUR SETS OF SIXTEEN DISTINCT RANDOM NUMBERS, WHERE THE RANDOM NUMBERS ARE INDEXES TO A SET OF 64K ORTHOGONAL SPATIAL PATTERNS
7. CENTRAL NETWORK TRANSMITS FIRST OK, AND THE SETS OF RANDOM NUMBERS
8. READER STEPS THROUGH THE TWENTY-FOUR SETS
  - 8A. READER ADDS TOGETHER SET OF ORTHOGONAL PATTERNS
  - 8B. READER PERFORMS DOT PRODUCT OF RESULTANT PATTERN AND CARD SCAN, STORES RESULT
9. READER TRANSMITS THE TWENTY-FOUR DOT PRODUCT RESULTS TO CENTRAL NETWORK
  10. CENTRAL NETWORK CHECKS RESULTS AGAINST MASTER
11. CENTRAL NETWORK SENDS FINAL APPROVAL OR DENIAL
12. CENTRAL NETWORK DEBITS MERCHANT ACCOUNT, CREDITS CARD ACCOUNT

FIG. 25

## THE NEGLIGIBLE-FRAUD CASH CARD SYSTEM



A BASIC FOUNDATION OF THE CASH CARD SYSTEM IS A 24-HOUR INFORMATION NETWORK, WHERE BOTH THE STATIONS WHICH CREATE THE PPHYSICAL CASH CARDS, 950, AND THE POINT-OF-SALES, 984, ARE ALL HOOKED UP TO THE SAME NETWORK CONTINUOUSLY

FIG. 26

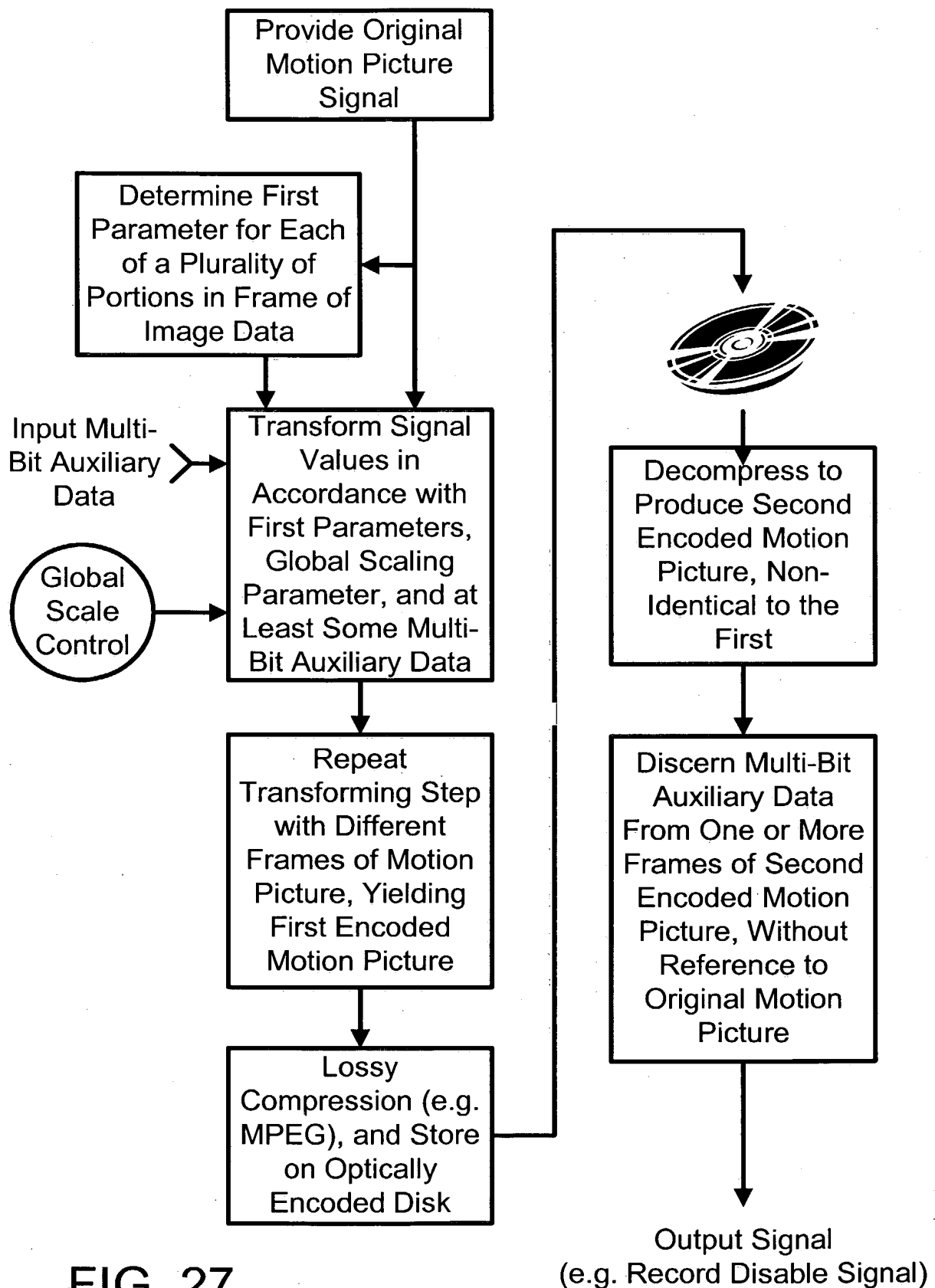


FIG. 27